

(19) World Intellectual Property
Organization
International Bureau



553326

(43) International Publication Date
2 December 2004 (02.12.2004)

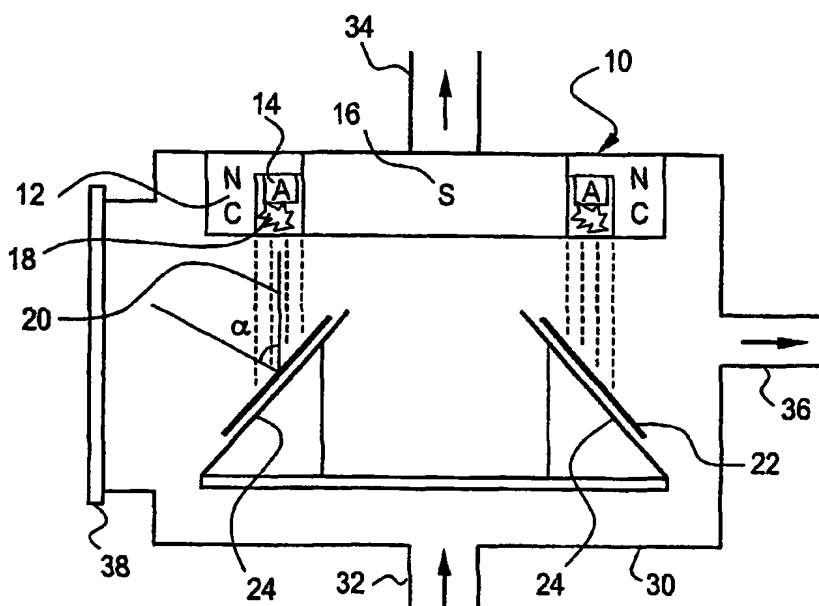
PCT

(10) International Publication Number
WO 2004/104682 A1

- (51) International Patent Classification: **G02F 1/1337** (74) Agents: **HUDAK, Daniel, Jr.** et al.; Hudak, Shunk & Farine Co. LPA, 2020 Front Street, Suite 307, Cuyahoga Falls, Ohio 44221 (US).
- (21) International Application Number: **PCT/US2004/015411**
- (22) International Filing Date: **17 May 2004 (17.05.2004)** (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data: **60/471,717** **19 May 2003 (19.05.2003)** **US**
- (71) Applicant (for all designated States except US): **KENT STATE UNIVERSITY [US/US]**; East Main and Lincoln Streets, Kent, OH 44242 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **CHIEN, Liang-Chy** [US/US]; 330 Oldham Way, Hudson, OH 44236 (US). **DOBROVOLSKYY, Andriy** [UA/UA]; G.-Naumova St. 19, Apt. 326, Kyiv, 03110 (UA). **YAROSHCHUK, Oleg** [UA/UA]; Ozerna St. 9, Apt. 62, Kyiv, 03110 (UA). **LAURENTOVICH, Oleg** [UA/US]; 5933 Roc Marie Drive, Kent, Ohio 44240 (US).
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: **METHOD OF PLASMA BEAM BOMBARDMENT OF ALIGNING FILMS FOR LIQUID CRYSTALS**



(57) Abstract: Methods for treating aligning substrates produces uniform alignment of liquid crystals in at least two modes. The method is based on the treatment of liquid crystal aligning substrates with a collimated or partially collimated plasma beam. In one embodiment, the method comprises a step of bombarding an aligning substrate with at least one plasma beam from a plasma beam source at a designated incident angle to align the atomic/molecular structure or the surface profile of the aligning substrate in at least one aligned direction.

WO 2004/104682 A1



Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.